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Title:
Cleaning plate for semiconductor fabricating device.

Abstract:

A cleaning plate for cleaning contact faces of components, such as a conveyer for transferring a wafer, and a hot plate for heating the wafer, etc., in a semiconductor fabricating device contacted with the surfaces of the wafer when it is transferred comprises a first layer (1) having the shape equal to that of the wafer and a second layer (2) made up of a fine-grained absorbent formed on at least one of the surface of the first layer (1). The first layer (1) comprises a wafer, at least one kind or more of metals, a composite-material, at least a metal and a polymeric material, an aluminum plate, or a plastic plate. The second layer (2) comprises a resin having a fine-grained absorbability, or a silicon absorbent.

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(54) Cleaning plate for semiconductor fabricating device.

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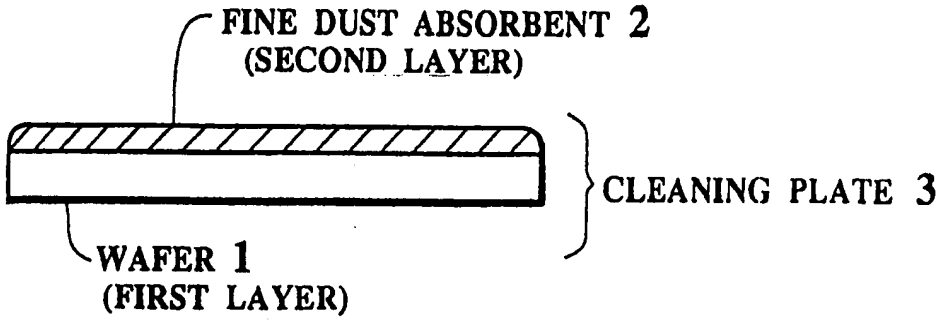
FIG.1



EP 0 416 645 A2

CLEANING PLATE FOR SEMICONDUCTOR FABRICATING DEVICE

BACKGROUND OF INVENTION

Field of the Invention

This invention relates to a cleaning plate for a semiconductor fabricating device, more particularly, it relates to a cleaning plate for cleaning contact faces of components, such as a conveyer, and a hot plate for heating a wafer, etc., in a semiconductor fabricating device contacted with the surfaces of the wafer when it is transferred.

Description of the Prior Art

In general, a cloth moistened with organic solvent such as alcohol is used in order to remove dust which adhere on contact faces of components (such as a conveyer for transferring a wafer, and a hot plate for heating the wafer, etc.) in a semiconductor fabricating device contacted with the surfaces of the wafer when it is transferred.

Hereinafter the contact faces of the components are called only "the contact faces".

The dust can be removed by directly wiping on the contact faces with the cloth.

Thereby, the visible dust of more than 100 μm in diameter can be removed by the use of the above mentioned method. But, the dust of approximately 100 μm or less in diameter can not be removed with the cloth.

While, there is another method in order to remove the dust of approximately 100 μm in diameter attached on the contact faces. By this method, the dust can be eliminated by contacting between the mirror surface of a wafer for cleaning and the contact faces. In this case, only some dust of 10 μm in diameter can be take off. When a wafer attached on the dust is used, the contact faces contacted with the wafer is further contaminated.

Moreover. a step for cleaning the contact faces is performed repeatedly many times until the contact faces become purity. Thereby, many manufacturing time is required for fabricating the semiconductor device.

On the other hand, according to the progress of a recently processing technique for semiconductor, a processing length of the semiconductor device tends to become more finely. Accordingly, it is necessary to remove a dust of 10 μm or less in diameter as many as possible.

However, a satisfied (required) amount of the dust for keeping the contact faces clean can not be removed by the conventional cleaning method.

As described above, by the conventional cleaning method for the contact faces of the components contacted with the wafer, it is difficult to adequately remove the dust of 10 μm or less in diameter attached on the contact faces.

In addition, a plurality of clean wafers are required for keeping the contact faces clean by using the conventional cleaning method. Consequently, there is a problem that the manufacturing time for fabricating a semiconductor device is more increased by the cleaning process.

SUMMARY OF THE INVENTION

An object of this invention is to provide a cleaning plate for efficiently removing a dust attached on contact faces of components, such as a conveyer, and a hot plate etc., in a semiconductor fabricating device contacted with the surfaces of a wafer when it is transferred.

A cleaning plate for cleaning the contact faces of the components contacted with the wafer according to this invention, comprises a first layer having the shape equal that of the wafer, and a second layer made up of a fine-grained absorbent formed on at least one of the surface of the first layer.

In the cleaning plate of the invention, the first layer is composed of a wafer and the second layer is made up of a resin having an absorbability of fine dust.

Moreover, for example the first layer is composed of an aluminum plate.

Furthermore, the first layer comprises a plastic plate and the shape of the cleaning plate of the invention, for example, is equal to a shape of the wafer.

This way, the cleaning plate of the invention comprises, for example the wafer as the first layer and the fine-grained absorbent as the second layer.

The second layer is formed on the first layer. When the cleaning plate is transferred on the surface of the components of the semiconductor fabricating device, the fine dust attached on the contact faces of the components can be efficiently removed by the cleaning plate of the invention.

Because the shape of the cleaning plate has the same shape of the wafer, the cleaning process can be performed by using the transfer process for transferring the wafer without adding a new cleaning process or a new cleaning system for cleaning the contact faces of the components in the semiconductor fabricating device.

The dust of more than 0.3 μm in diameter can

be removed by using the cleaning plate according to the invention.

When compared to the wafer as the conventional cleaning means, the cleaning plate of this invention has a cleaning ability of twenty two (22) times than that of the conventional cleaning means.

Accordingly, the frequencies of the cleaning process can be decreased by using the cleaning plate according to the invention.

These and other objects, feature and advantages of the present invention will be more apparent from the following description of a preferred embodiment, taken in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a cleaning plate used in a first embodiment of the invention.

Figs. 2 and 3 show fabricating methods of the cleaning plate as shown in Fig. 1.

Fig. 4 shows a sectional view of a cleaning plate of a second embodiment according to the invention.

Fig. 5 is a fabricating method of the cleaning plate as shown in Fig. 4.

Fig. 6 is a sectional view of a cleaning plate of a third embodiment according to the invention.

Fig. 7 shows a comparison diagram for a cleaning ability between the cleaning means used in the conventional method and the cleaning plate according to the invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

We shall now describe embodiments of a cleaning plate for cleaning contact faces of components (such as a conveyer, and a hot plate for heating a wafer, etc.) in a semiconductor fabricating device contacted with the surfaces of the wafer when it is transferred according to the invention with reference to Figs. 1 to 7.

Fig. 1 shows a sectional view of a cleaning plate as a first embodiment of this invention.

In the drawing, a numerical number 1 denotes a wafer as a first layer of the cleaning plate. A numerical number 2 designates a fine-dust absorbability means or absorbent as a second layer. The first layer is covered with the second layer 2.

The cleaning plate of the embodiment having above mentioned construction was formed by using a spin coating process as shown in Fig. 2.

In the same drawing, first, the-wafer 1 was installed on the spin-chuck 21. The thickness of the wafer 1 was approximately 0.625 mm.

Next, an absorbent 23 was coated on the wafer 1 from a dispense nozzle 24 keeping a rotation of the spin chuck 21 at 1,000 to 5,000 r.p.m. .

TSE3033 as a Si absorbent No.1 and TSE3250 as a Si absorbent No.2 are used as the absorbent 23, which are manufactured by TOSHIBA SILICON Corp.

The spin coating was performed for approximately 30 to 60 seconds. The thickness of the absorbent 23 formed by using the spin coating method was less than 1 mm.

Moreover, the shape of the cleaning plate 3 was formed as same as that of the wafer transferred on the transfer surface.

After the spin coating process, the cleaning plate was dried by keeping it in atmosphere for approximately 30 minutes. Then, the cleaning plate was heated at temperature range of 150 to 160 °C . Moreover, as shown in Fig. 3, a coating roller 30 instead of the spinner used in the spin coating method could be used for fabricating the absorbent 23 on the wafer 1. In this case, the drying and heating processes after the fabrication of the absorbent 23 on the wafer 1 were performed just as like the spin coating method as described above.

A dust removable ability of the cleaning plate 3 formed by the above described fabricating process is measured on the contact faces of the components in the semiconductor fabricating device. The cleaning method in which the absorbent 2 is transferred on the contact faces of the components is used for the measurement of the dust removable ability.

Fig. 7 is a diagram showing the difference of the dust removable ability between the conventional cleaning plate (only a wafer) and the cleaning plate of the present embodiment.

The measurement of the dust on the surface of the conveyer is performed with the dust counter WM-II (manufactured by TOKYO KOUGAKU Corp.).

In the same diagram, the vertical line shows the number of dust removed by the cleaning plate and the horizontal line shows the type of cleaning material.

Moreover, only the dust more than 0.3 can be measured by the dust counter.

In the diagram, when the alcohol is used as the cleaning means, the contact faces of the components are polluted so that the number of dust on the contact faces is increased by 372 dusts.

When the wafer is used as the cleaning means, approximately 10 dusts on the contact faces of the components are removed.

When the Si-absorbent 1 (Si-adhesive 1) as the cleaning plate of the present embodiment is used, approximately 70 dusts on the contact faces of the components can be eliminated. In addition, when the Si-absorbent 2 (Si-adhesive 2) as the cleaning

plate is used as the cleaning plate, approximately 220 dusts on the contact faces can be removed.

Accordingly, it can be understood that the dust removable ability of the cleaning plate of the embodiment has about 22 times as high as that of the conventional cleaning plate.

Dust of less than 0.3 µm can not be detected by the measurement limitation of the dust counter WM-II

But it can be assumed that the dust of less than 0.3 µm can be removed with the cleaning plate of the embodiment.

In the above described embodiment, the cleaning plate comprising the wafer and the absorbent formed on the wafer is disclosed.

When a cleaning plate having a construction formed absorbent on the both side of the wafer is used, it can be further eliminated not only the dust on the contact faces of the components but also the atmosphere in the semiconductor fabrication device.

Fig. 4 shows a cross sectional view of a second embodiment of the cleaning plate 40 according to the invention. In the same diagram, a fine-grained absorbent 41 is covered on the both surface of the wafer 1. The shape of the cleaning plate of the second embodiment is formed as same as that of the cleaning plate of the first embodiment.

In the fabrication method of the cleaning plate of the third embodiment, as shown in Fig. 5, for example the wafer 1 is dipped in a melted absorbent 51 for a predetermined time (the dip method).

In the second embodiment as described above, the absorbent is formed on the both surface of the wafer 1. But, the cleaning plate of the third embodiment may be formed only with the absorbent without the wafer.

Fig. 6 is a sectional diagram of a cleaning plate of a third embodiment according to the invention. In the same diagram, the cleaning plate 60 is formed only by the absorbent of the second layer as shown in Fig. 4. In the fabricating method of the cleaning plate of the third embodiment, for example the cleaning plate is fabricated with a rapping plate. The shape of the cleaning plate of the third embodiment is formed as same as that of the cleaning plates of the first and second embodiment as shown in Figs. 1 and 4.

Thus, the dust of less than 10 µm can be eliminated effectively from the transfer surface of the conveyer.

The wafer as the first layer is used in the first and second embodiments.

This invention is not limited to the specific embodiments described above but various modifications are possible without departing from the scope of the invention.

For example, an aluminum plate as a metal plate or a plastic plate as a polymeric material as the first layer can be used for obtaining the same cleaning effect.

Moreover, it is verified by the same test of the first to third embodiments that a cleaning plate with a natural rubber, an acrylic resin or a copolymer of an epoxy resin and a nylon as the second layer has the same cleaning ability.

Accordingly, the second layer is not limited to the type of resin as far as it has the fine-grained absorbability.

Moreover, the shape of the cleaning plate is required as same as that of the wafer for most efficiently transferring it on the transfer surface of the conveyer.

However, a cleaning plate having another shape, for example a perfect disk without an orientation flat, can also be used as far as it can be transferred on the contact faces of the components in the semiconductor fabricating device. This can be used without departing from the scope of the invention.

In addition, the cleaning plate of these embodiment according to the invention can withstand use of several times in cleaning operation for the semiconductor fabricating device.

Various modification will become possible for those skilled in the art after the teaching of the present disclosure without departing from the scope thereof.

Reference signs in the claims are intended for better understanding and shall not limit the scope.

Claims

1. A cleaning plate for cleaning contact faces of components in a semiconductor fabricating device contacted with the surfaces of a wafer, comprising:
a first layer (1) having the shape equal to that of the wafer; and
a second layer (2) made up of a fine-grained absorbent formed on at least one of the surface of the first layer (1).

2. A cleaning plate according to claim 1, wherein the first layer (1) comprises the wafer.

3. A cleaning plate according to claim 1, wherein the second layer (2) comprises a resin having a fine-grained absorbability.

4. A cleaning plate according to claim 1, wherein the second layer (2) comprises a silicon absorbent.

5. A cleaning plate according to claim 1, wherein the first layer (1) comprises at least one kind or more of metals.

6. A cleaning plate according to claim 1, wherein the first layer (1) comprises a composite-material which is made up of a polymeric material.

7. A cleaning plate according to claim 1, wherein

the first layer (1) comprises a composite-material which is made up of at least a metal and a polymeric material.

8. A cleaning plate according to claim 5, wherein the first layer (1) comprises an aluminum plate.

9. A cleaning plate according to claim 6, wherein the first layer (1) comprises a plastic plate.

10. A cleaning plate according to claim 1, wherein the second layer (2) comprises a resin having a fine-grained absorbability and having the shape equal to that of the wafer.

11. A cleaning plate for cleaning contact faces of components in a semiconductor fabricating device contacted with the surfaces of a wafer, comprising:
a wafer (1); and
layers made up of a fine-grained absorbent formed on the both surfaces of the wafer having the shape equal to that of the wafer.

12. A cleaning plate for cleaning contact faces of components in a semiconductor fabricating device contacted with the surfaces of a wafer, comprising:
a layer (20) made up of a fine-grained absorbent having the shape equal to that of the wafer.

FIG.1

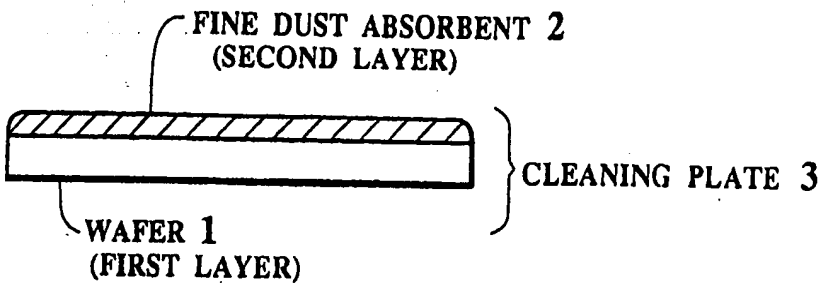


FIG.2

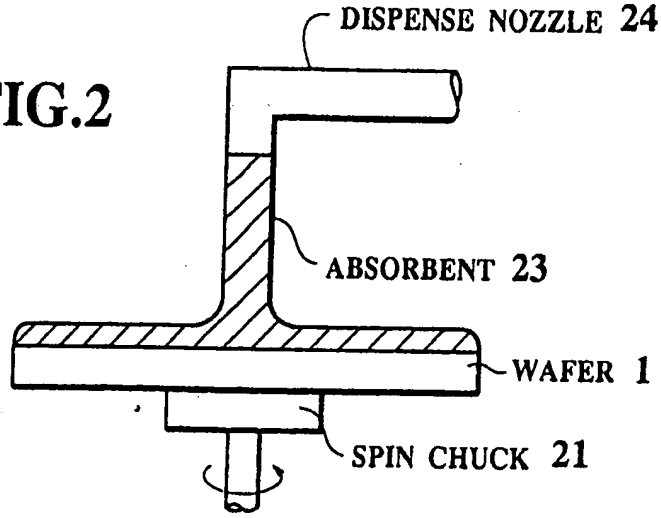


FIG.3

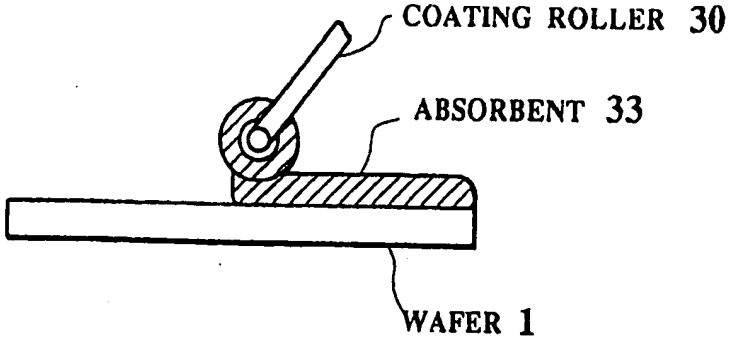


FIG.4

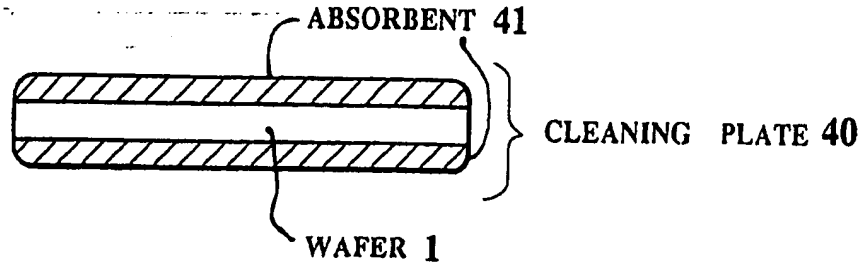


FIG.5

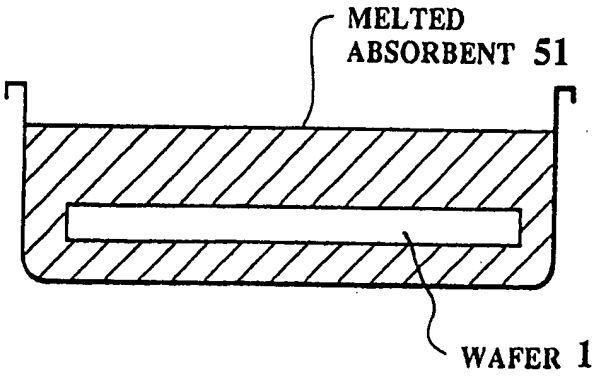


FIG.6

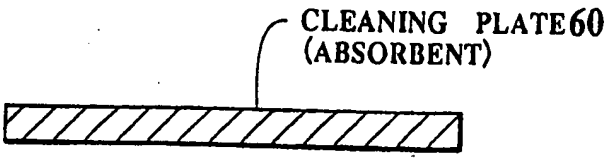


FIG.7